Assignments-Lecture Moudle-5

Lecture-1: Radiotracer Applications in Industry

1. Discuss the principle of radiotracer technique and properties of an ideal radiotracer ?

2. Discuss the criteria of selection of a radiotracer and also reasons why industry prefer to use radiotracers over conventional tracers?

3. Why bromine-82 is most commonly used radiotracers for industrial applications. List a few commonly used radiotracers for gas and solid phase tracing?

4. Discuss residence time distribution and its application in practice. If the flow rate through a system of volume 100 m^3 is 5 m^3/h and experimentally measured mean residence time is 10h, then estimate the percentage of dead volume inside the system?

Lecture-2: Radiotracer Applications in Hydrology

1. Explain the radiotracer dilution principle of flow rate measurements in canals?

2. Briefly discuss the radiotracer methodology for sediment transport investigations in Ports?

3. How radiotracers are used for groundwater velocity measurement? Discuss briefly.

Lecture-3: Application of Environmental Isotope Tracer Techniques in Hydrology

1. Discuss the principle of environmental isotope techniques used in hydrological investigations. What is GMWL and how is it useful in hydrology.

2. How to estimate the recharge altitude of springs in mountainous regions using isotope methodology?

3. What is the principle of groundwater dating and what are the common isotopes used to date groundwater?

Lecture-4: Sealed Source Applications in Industry

1. Briefly discuss the principle of sealed source applications. How one can apply the gamma ray attenuation technique to identify the malfunctions and mechanical integrity of the internal structures/component of a process system?

2. List the different gauges used in industry and how these gauges are used to measure parameters, control the process and improve the product quality in industry.

3. How one can estimate the quantity of ash in a coal-ash mixture using a nucleonic gauge. Discuss briefly.

Lecture-5:Radiation Processing Applications in Industry

1. How the radiations affects the materials and are utilized to improve the quality of materials. Discuss briefly.

2. Mention different radiations used in material processing applications with their specific advantages/disadvantages.

3. List the radiation doses required for degradation of teflon, wastewater treatment, polymer crosslinking, food irradiation and sterilization of medical products.